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United Kingdom(51) INT CL⁶

B62D 53/00

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(56) Documents Cited

GB 2185222 A GB 1493309 A GB 1116717 A
EP 0552027 A1 WO 89/10293 A1 WO 82/03049 A1
US 4762192 A

(58) Field of Search

UK CL (Edition O) B7H HC
INT CL⁶ B62D 53/00 53/02 53/04**(54) Articulated transporter**

(57) A vehicle for transporting heavy equipment such as tanks comprises self-propelled reversible steerable units 1a,1b at opposite ends of a load platform in the form of a lifting beam 3. Each tractor unit 1a,1b has articulated connections to the platform 3, including a variable-height goose neck 2 and a turntable 5 which, through the adjustment of hydraulic cylinders (10, Fig 4), 19,23 enable the ground clearance of the platform 3 to be adjusted and the weight of the load to be redistributed between the units 1a,1b. Each unit 1a,1b has an engine 101, a reversing transfer gearbox 5 and a combination of drive and/or steer axes 102-106 enabling the vehicle to be manoeuvrable and to driven in either direction at the same speed.

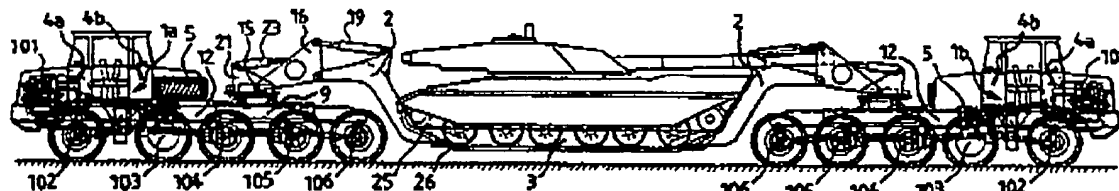


FIG. 1

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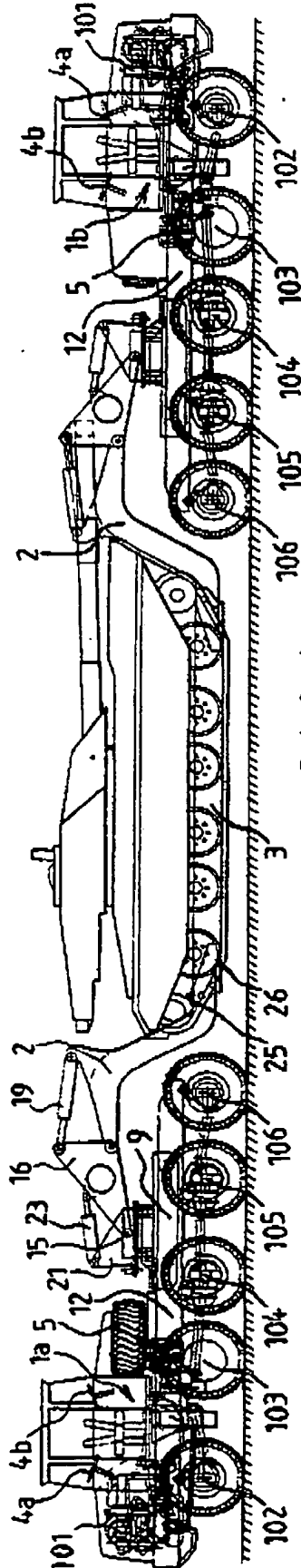


FIG. 1

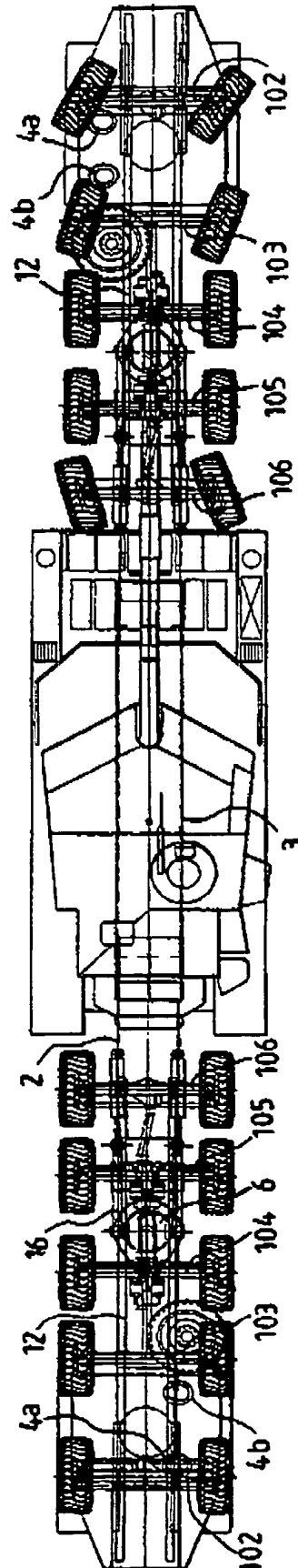
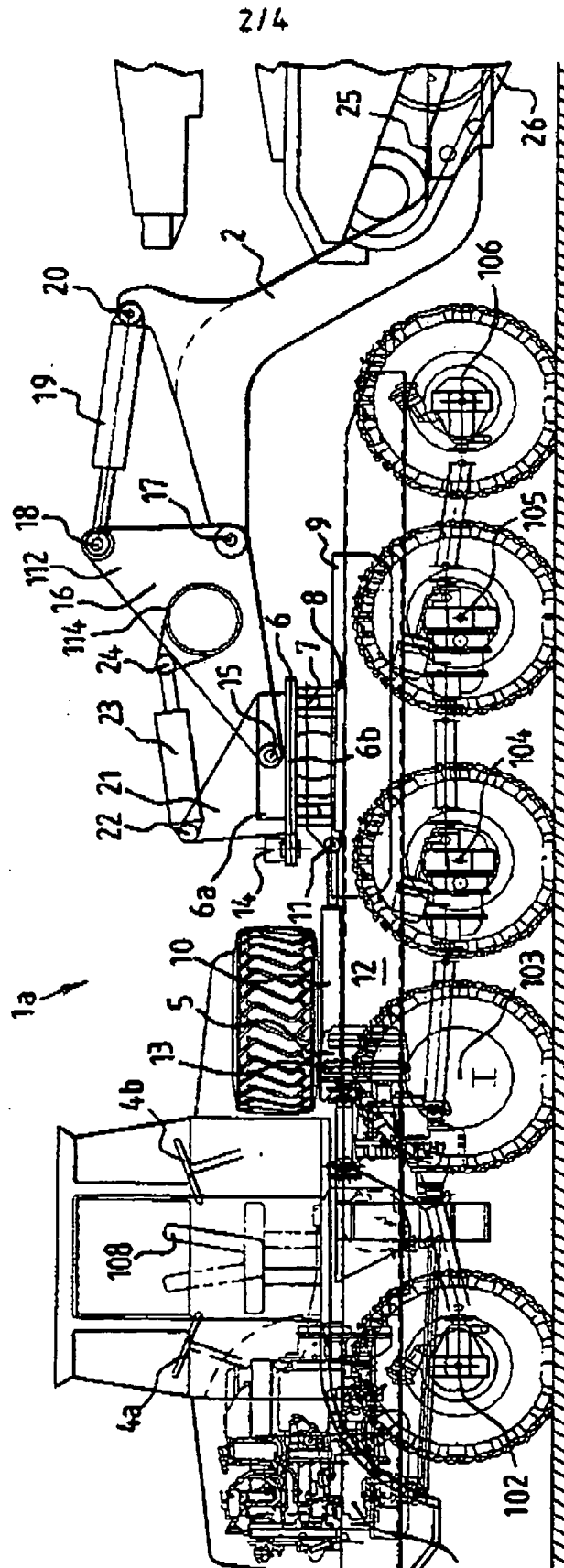


FIG. 2

FIG. 3



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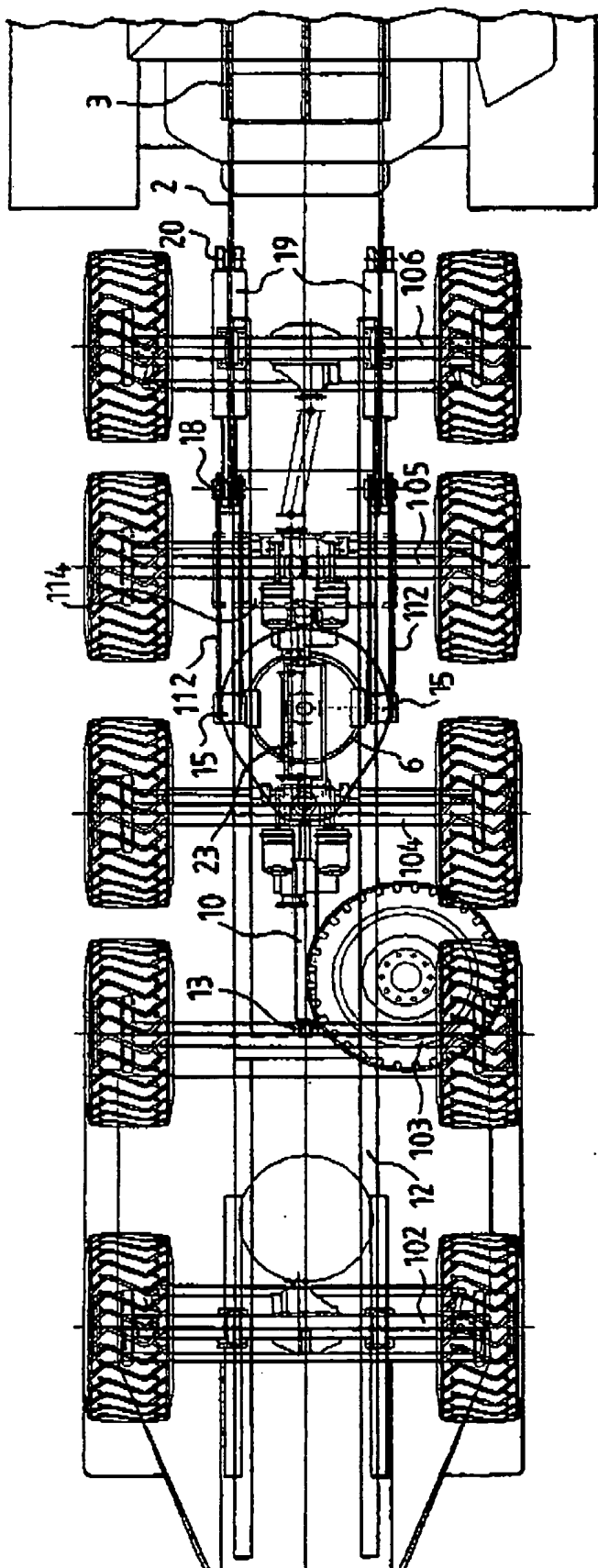
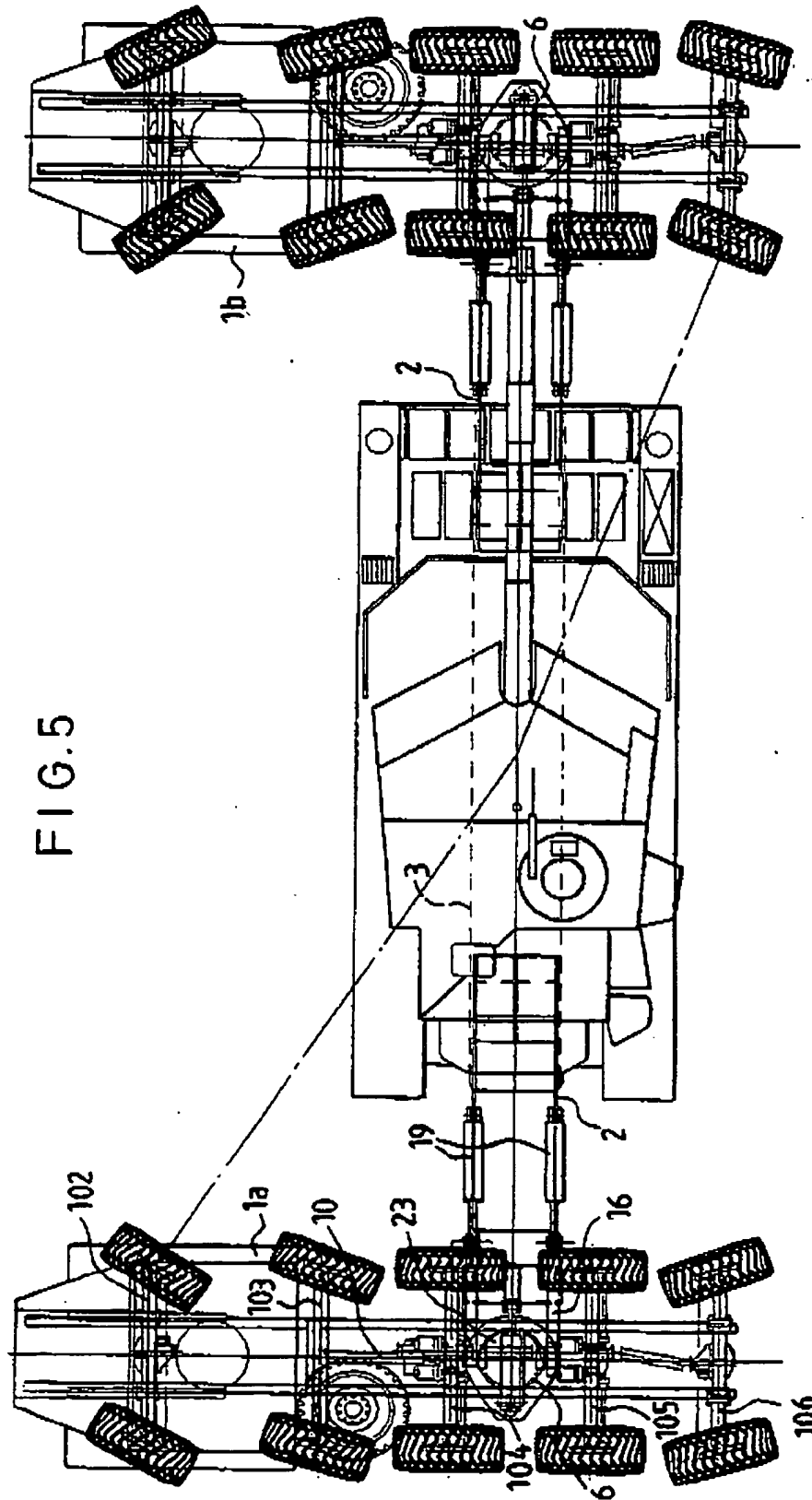


FIG. 4

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M&C Folio: 230P75949

Document #: 92536

Transporter

This invention relates to a vehicle for transporting heavy equipment such as tanks. What is desired is a vehicle which is manoeuvrable and can distribute the load rationally.

The invention provides a transporter with tractor units at opposite ends of a load platform.

In the preferred embodiment, as described further below, each tractor unit has an equal share of the load and can rotate relative to the platform so as to limit torsionally induced stresses in the units and the platform. Hydraulic cylinders can be used to raise or lower the load at each end of the combination. Hydraulic cylinders can also be used to change the weight distribution on the axles of a multi-axle unit. A turntable (or so-called "fifth wheel") can be arranged to be movable longitudinally on a chassis so as to adjust load distribution and increase clearance between the tractor unit and associated structures. Provision of a reversing gearbox, preferably in conjunction with a reversing steering location for a driver, enables the vehicle to be driven at equal speeds in both directions.

The invention will be described further, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a phantom side view of a transporter, carrying a tank;

Figure 2 is a phantom plan view corresponding to Figure 1;

Figure 3 is an enlarged phantom side view of one end of the transporter, illustrating a first one of two tractor units;

Figure 4 is a phantom plan view corresponding to Figure 3; and

Figure 5 is a phantom plan view of the transporter in a turning position.

The transporter illustrated comprises first and second tractor units 1a, 1b having articulated connection structures including variable-height goose necks 2 connected to opposite ends of a load platform in the form of a lifting beam 3. The load depicted by way of example is a tank whose tracks are suspended over each side of the beam 3 while the bottom of its hull rests on the beam.

Each tractor unit has an engine 101 and a plurality of wheel axles 102-106 (five in the example shown), the majority of which are drive axles; in the present case the front axle 102 and the rear axles 104-106 are driven, and the front axles 102-103 and the rear axle 106 are steered. Each unit has a forward steering position with a steering wheel 4a and a backward steering position with a steering wheel 4b, a driver's seat 108 being swivellable between the two positions. The transmission from the engine 101 to the driven wheel axles 102, 104-106 includes a reversing transfer gearbox 5 enabling the unit to be driven in either direction at the same speed.

The articulated connection structure on each unit (1a or 1b) includes a turntable 6 having an upper section 6a rotatable about a vertical axis and a stationary lower section 6b, which can be locked together by a locking pin 14 to preclude rotational movement when the tractor unit and the beam 3 are in line. The lower section 6b is mounted on a sliding platform or base 8 so as to be pivotable about a longitudinal axis 7. The base 8 is slidable along a longitudinal translational axis on a guide structure 9 on the chassis 12 of the unit by means of a hydraulic piston-and-cylinder device 10 attached to the base 8 at a pivot 11 and to the chassis 12 at a pivot 13, for the purpose of increasing the clearance between the goose neck 2 and the rear wheels and changing the distribution of the weight of the load between the units.

The upper section 6a of the turntable 6 has, on each side, a lateral pivot 15 attached to the front end of a linking structure 16 which is generally triangular in elevation. The structure 16 has two double sidewalls 112 connected by a cylindrical cross-member 114. At its rear end the linking structure 16 has a lower pivotal connection 17 to the front, upper end of the goose neck 2 and an upper pivotal connection 18 to one end of a pair of hydraulic piston-and-cylinder devices or struts 19 (or one such strut) whose other end is pivotally attached at 20 to an intermediate portion of the goose neck 2. Extension of the hydraulic struts 19 raise the goose neck 2 (by turning the structure 16 about the pivots 15) and retraction lowers it.

The upper section 6a of the turntable 6 has an upper extension 21 which has a pivotal connection 22 to one end of a hydraulic piston-and-cylinder device or strut 23 whose other end has a pivotal connection 24 to the cross-member 114 of the linking structure 16. Extension of the hydraulic strut 23 creates a moment about the transverse axis of the lateral pivots 15 forcing extra weight onto the front axles and reducing the weight on the rear axles; retraction of the hydraulic strut 23 has the opposite effect; the strut 23 may also be arranged so as to merely exert a damping effect on pivotal motion about the lateral pivots 15.

The goose neck 2 comprise a box-section whose rear, lower end fits inside the (hollow) beam 3. When the goose neck 2 is not attached to the beam 3, the hydraulic strut 23 and/or the hydraulic struts 19 can be used to change the height and/or the angle of the goose neck 2, to facilitate connection. The combined weight of the beam 3 and the load imposes a compressive force acting between the goose neck 2 and the beam 3 at locations 25 and 26 (Figures 1 and 3), preventing the goose neck 2 being inadvertently removed from the beam once the load has been lifted.

The above-described transporter can provide the following advantages. It enables 80% or more of the total weight of the loaded vehicle to be taken by the driven wheels, compared with only up to 40% in conventional heavy equipment transport vehicles. With a 75t load, the maximum axle load is less than 12t. By allowing the tracks of the

tank (or other tracked vehicle) to bear on the road surface in a controlled way, load sharing is enabled. The overall weight is reduced compared with conventional transporters. The (adjustable) length of the transporter and the controllable weight distribution enable bridge gap crossing in situations that would be impossible with conventional transporters. The complete transporter can itself be transported in a compact space, in an aircraft for example. As is illustrated in Figure 5, the overall turning circle is reduced because of the steerability of each end of the transporter.

CLAIMS:

1. A transporter comprising tractor units at opposite ends of a load platform, each unit being a self-propelled reversible steerable unit having an articulated connection structure for connecting the unit to the load platform.
2. A transporter as claimed in claim 1, in which the connection structure has a transverse pivot axis.
3. A transporter as claimed in claim 2, in which the connection structure includes means for applying a moment about the transverse pivot axis in order to distribute force from the load platform to the unit.
4. A transporter as claimed in any of claims 1 to 3, in which the connection structure has a longitudinal pivot axis.
5. A transporter as claimed in any of claims 1 to 4, in which the connection structure has a longitudinal translational axis.
6. A transporter as claimed in any of claims 1 to 5, in which the connection structure includes means for selectively raising and lowering the corresponding end of the load platform.
7. A transporter as claimed in any of claims 1 to 6, in which each unit has a reversing gearbox enabling the unit to be driven selectively in either direction at the same speed.
8. A transporter as claimed in any of claims 1 to 7, in which each unit has a forward steering position and a backward steering position, for a driver.

9. A transporter as claimed in any of claims 1 to 8, in which each unit has a plurality of drive axles.
10. A transporter as claimed in any of claims 1 to 9, in which each unit has a plurality of steering axles.
11. A transporter as claimed in any of claims 1 to 10, in which the articulated connection structure comprises a turntable.
12. A transporter as claimed in claim 11, in which the turntable is mounted for pivoting about a longitudinal axis on a base.
13. A transporter as claimed in claim 12, in which the base is mounted for longitudinal sliding on a guide structure.
14. A transporter as claimed in any of claims 1 to 13, in which the connecting structure includes a linkage including at least one hydraulic strut.
15. A transporter as claimed in claim 14, in which the linkage includes a goose neck having a lower end connected to the load platform.
16. A tractor unit for a transporter according to any preceding claim.
17. A tractor unit substantially as described with reference to the accompanying drawings.
18. A transporter substantially as described with reference to the accompanying drawings.



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Application No: GB 9623431.5
Claims searched: 1 to 18

Examiner: Robert Crowshaw
Date of search: 12 August 1997

Patents Act 1977 **Search Report under Section 17**

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): B7H (HC)

Int Cl (Ed.6): B62D 53/00, 53/02, 53/04

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2185222 A (COAL INDUSTRY) Whole document relevant, but note the abstract and figure 1.	1 at least
X	GB 1493309 (SOCIETE ANONYME SECMAFER) Whole document relevant, but note page 2 lines 96-105 and page 3 lines 89-95.	1 at least
X	GB 1116717 (CATERPILLAR) Whole document relevant, but see especially figure 1.	1 at least
X	EP 0552027 A1 (DOSCO) Whole document relevant, but note column 4 lines 11-19 and 49-58.	1 at least
A	WO 89/10293 A1 (MCGHIE) See figure 1.	
A	WO 82/03049 A1 (PLYMOTH) See figure 3.	
X	US 4762192 (MAXWELL) Whole document relevant, but note column 9 lines 33 to column 10 line 54.	1 at least

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.